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THE

ECONOMIC PROCEEDINGS

OF THE

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XXIV.

INJURIOUS INSECTS AND OTHER ANIMALS OBSERVED IN IRELAND DURING THE YEAR 1908.

By GEORGE H. CARPENTER, B.SC., M.R.I.A., F.E.S., Professor of Zoology in the Royal College of Science for Ireland, and Consulting Entomologist to the Royal Dublin Society.

(Plates LV.–LIX.)

[Read, May 25; Received for Publication, June 2; Published, July 30, 1909.]

CORN AND GRASS INSECTS.

Crane-flies.

Tipula oleracea (Linn.) and other species.

The destructive grubs of these common insects have been frequently mentioned in this series of papers (4, pp. 197-9, 249, 281–2, 291). At the end of May, 1908, they were reported by Mr. J. Johnston, Agricultural Instructor, in County Waterford, as exceptionally injurious to growing oats in his district. Some fields that he observed were eaten quite bare, hardly a plant being left except for a space of 10 or 15 yards from the fences, within which the grubs had done but little damage.

In County Cavan, late in August, the flies were abnormally abundant, "like a swarm of locusts," according to the observations of Mr. J. A. Faris, of Cornafean.

The Silky Beetle.

Dascillus cervinus (Linn.).

(Plate LV.)

Early in February, 1908, I received for identification from the editors both of the *Farmer's Gazette* and the *Irish Farming World* a number of unfamiliar beetle-larvæ that were believed to be injuring the roots of young oat-plants and of grasses in pastures. Mr. W. J. Walsh, of Kingswood, Clondalkin, County Dublin, who

had sent one batch of specimens, was good enough to forward subsequently a number of living grubs, one of which pupated on April 10th; and the perfect beetle, which proved to be *Dascillus cervinus*, appeared on April 29th.

Meanwhile a specimen of the same larva, also from County Dublin, had reached the British Museum, where Mr. C. O. Waterhouse identified it from an old description by Erichson as belonging to *Dascillus cervinus*. An account of its structure was subsequently published by Mr. C. J. Gahan (6), who, in correspondence with me on the subject, pointed out the observations recorded a few years ago by Boas (1). In one of the last-named zoologist's papers there is a good figure of the larva, and in the other of the pupa; but his work, on account of the medium of its publication, has escaped the notice of most English-speaking zoologists.

The cuticle of the larva (Plate LV., fig. 1) is firm and well-chitinised. The head is very large, with a broad, curiously asymmetrical labrum (fig. 1 a) and rather elongate four-segmented feelers, the terminal segment being minute (Plate LV., fig. 2). Each mandible (Plate LV., fig. 3) has at the tip a sharp tooth and two cutting teeth on the inner face, beneath which is a slender hinged tooth (*prostheca*), that of the left mandible longer and more slender than that of the right, and a broad basal molar or grinding surface. The maxilla (Plate LV., fig. 4) is remarkably like the maxilla of a developed beetle, consisting of cardo, stipes, lacinia with bifid tip, pointed galea, and three-segmented palp. The labium (fig. 5) has a broad mentum, an emarginate ligula, and a pair of two-segmented palps; the ventral sclerite, to which the mentum is jointed, lies very distinctly posterior to the general head-skeleton, recalling the primitive arrangement that characterizes the Orthoptera.

The thoracic segments are short and broad, the legs being rather elongate, each consisting of a coxa, trochanter, femur, tibio-tarsus, and single slender claw (Plate LV., fig. 1). The abdomen tapers slightly to the hinder end; nine tergites are visible dorsally, as is usual in beetle larvæ; the ninth is evenly rounded behind, and bears a pair of short acute processes.

According to Boas' observations (1) in Denmark, the grubs live

in bog-meadows where they eat the roots of grass, so that hay and pastures suffer severely, the highest and dryest parts of the meadows being most attacked; they also injure oats. In the case of the specimens that I kept for some weeks alive under observation, I noticed that they hung on to grass roots with their large mandibles, while the crops of specimens that I dissected contained particles of earth and fragments of plant tissues. Gahan observes that "the large basal molar tooth with which each of the mandibles is furnished affords strong evidence as to the vegetable-feeding habits of the larva."

The life-cycle occupies two years according to Boas' statement, from which it appears that pupation takes place about the same time of year in Denmark as in Ireland. Some of the specimens from County Dublin were only half as large as the full-grown ones; presumably they were in their first year of larval life. The pupa (Plate LV., fig. 6) is of the usual "free" coleopterous type, lying on its side in an earthen chamber with the body bent almost into a semicircle. Spiracles are present on the abdominal segments from the second to the seventh, inclusive, and the ninth abdominal segment is prolonged behind into a pair of sharp processes. The tenth (anal) segment does not extend beyond the ninth.

The Dascillidæ are a family of beetles represented in our fauna by a few terrestrial, marsh-haunting, and aquatic species. *Dascillus cervinus*, the only Irish species of its genus, is often found under stones, especially in hilly districts. It is an elongate beetle (Plate LV., fig. 7), with rounded prothorax, and small head carrying feelers, with eleven segments, inserted directly in front of the eyes; the shins of the legs are slender, and each foot has five segments. The insect is fawn-colour, with darker markings on the prothorax, and the whole body is covered with a dense pale silky pubescence.

Dascillus cervinus is widely distributed in Ireland, occurring most frequently in the hill districts. Besides the County Dublin localities, County Wicklow also proved to be a centre for the insects in 1908. More than twelve years ago I received a number of the grubs from Westmeath, where they were injuring an oat crop; at that time I failed to rear or identify them.

The preventive and remedial measures usually taken against wire-worm and crane-fly grubs might be tried with hope of success against the larvæ of Dascillus. Boas states that kainit has certainly a harmful effect on the insects.

CABBAGE AND TURNIP INSECTS.

The Cabbage Aphid.

Aphis brassicæ, Linn.

The familiar "green-fly" of the cabbage has been already described at some length in this series of papers (4, pp. 321–6). It was reported in August, 1908, as extremely troublesome at Killorglin, County Kerry, and at Loughrea, County Galway.

The Brassy "Turnip-fly."

Phyllotreta consobrina, Curtis.

An account of this insect was given in the last of this series of papers (4, pp. 569–70). Specimens were received in July from Celbridge, County Kildare, where they destroyed six beds of Brussels-sprouts and two beds of cabbage, not leaving a single plant. Plenty of lime and soot was scattered over the plants without the least effect.

The Cabbage-fly.

Phorbia brassicæ, Bouché.

Every year brings complaints of the ravages of this common maggot (4, pp. 141–4). In June, 1908, specimens were received from near Dublin and from Naas; at the latter locality roots were eaten right across, and the crop, over an acre, badly damaged. In September the maggots were found near Dundalk in the crowns of Swedes, so that the crop was seriously injured.

The Turnip Moth.

Agrotis segetum, Schiff.

Fully grown specimens of the caterpillars of this common moth (see 4, pp. 432–4) were sent at the end of August from the

neighbourhood of Cork, by Mr. J. Adams, Agricultural Inspector for the county. They had done much damage to a field of Swedes by their usual habit of feeding inside the roots.

The Cabbage Butterflies.

Pieris brassicæ (Linn.), *P. rapæ* (Linn.), and *P. napi* (Linn.).

During the summer and autumn of 1908 complaints were received from the western counties (especially Galway, Mayo, and Donegal) of exceptional damage by the caterpillars of these familiar insects, the warm weather having apparently favoured their excessive multiplication.

POTATO PESTS.

The Field Slug.

Agriolimax agrestis (Linn.).

(Plate LVI.)

In a previous paper (4, pp. 326–8), this common and destructive mollusc was figured and described. In February, 1908, specimens of potatoes bored and tunnelled by the slugs (see Plate LVI.) were received from Mr. A. Carrick, County Agricultural Instructor, Monaghan. The potato crop was damaged in this way in several localities in the county, but it is noteworthy that tubers of the "Up-to-date" variety entirely escaped injury.

Spotted Snake-Millipedes.

Blaniulus sp.

Attention has been previously directed (4, pp. 295, 434, 441) to the great damage which these small millipedes frequently do to potato-tubers. Similar cases of injury were reported from County Dublin in February, and from near Cork in October. The application of a dressing of salt, and the "planting" of hollowed-out mangels as traps, seem the remedies most readily available.

MANGEL INSECTS.

The Black Aphid.

Aphis rumicis, Linn.

These "collier" aphids are very familiar to all gardeners from their habit of crowding high up on the shoots of bean-plants. In August specimens were received from Limerick, which had similarly attacked mangel. In 1895 a severe attack on the mangel crop by this species was recorded in North Wales (Omerod, 10, pp. 51–6). It is very variable in the nature of its food-plant. The black wingless females (fig. 1, 4) that crowd on the plants through the summer, and bring forth active young by virgin reproduction, are the most familiar form of this insect.

FIG. 1.—Black Aphid or "Collier" (*Aphis rumicis*). 1. Aphids on Bean-shoot, natural size. 2. Male, magnified. (3 shows natural size.) 4. Wingless virgin female, magnified. From Ormerod's "Reports."

The winged virgin females which migrate and spread infection to other plants are also black, occasionally slightly rusty-brown. The nymphs from which the winged insects develop are slaty-grey with black wing-rudiments and a black hind-body which has white downy spots on each side arranged in series. In autumn black winged males (fig. 1, 2) and wingless egg-laying females are produced; the eggs which are laid after pairing remain unhatched through the winter, and give rise to virgin "stem-mothers" in the succeeding spring (see Buckton, 2, vol. ii., pp. 81–6).

On account of the conspicuous appearance of the colonies of

these aphids, it is comparatively easy to cut off and destroy the infested leaves or shoots in cases where the area under the crop is not too great. As a spray-fluid, quassia-wash will probably be found effectual; and the exposed position of the aphids while feeding increases the chance of effective spraying to destroy them.

The Bright-line Brocade Moth.

Mamestra oleracea (Linn.).

In the last paper of this series (4, pp. 571–2) a description and figures were given of this moth and its caterpillar, which had proved destructive to mangel in the southern counties of Ireland. At the end of September, 1908, I received from Mr. J. A. Faris, of Cavan, further specimens of the caterpillars, with the information that in his neighbourhood the mangel crop had been badly injured by them, and that they had not previously been noticed in the locality. Evidently this insect is likely to prove itself worthy of attention by farmers.

ORCHARD INSECTS AND MITES.

The Black Currant and Hazel Gall-Mites.

Eriophyes ribis, Nal. and *E. avellanæ*, Nal.

The mite that causes "big bud" on Black Currant has been previously described and discussed (4, pp. 260–2, 301–2, 441, 581). In February, 1908, shoots infested with it were received from Ballymena, County Antrim. In March, Mr. Peter Brock, County Horticultural Inspector for Fermanagh, sent a Hazel-shoot with "big buds" very similar to those on the currant, and caused by an allied species of Eriophyes (*E. avellanæ*). Fear has been expressed that currant bushes might be infected from hazel, but the two species are quite distinct.

The Apple Sucker.

Psylla mali (Schmidb).

During the spring of 1908, complaints were received from many parts of the country of the damage done by the larvæ and nymphs of this insect, which on account of their small size are

frequently overlooked. Mr. Seabrook of Chelmsford, who travelled through many counties of Ireland during the year, stated that in every orchard that he entered, whether in the north or in the south, traces of the ravages of the insect could be noticed. Specimens were forwarded to me from counties Dublin and Fermanagh.

The Psyllidæ or "Jumpers"—the family to which the insect belongs—are included in the Homoptera, that sub-order of sucking insects which comprises cicads, frog-hoppers, plant-lice or "green-fly," and scale-insects. The Psyllidæ have feelers with eight or

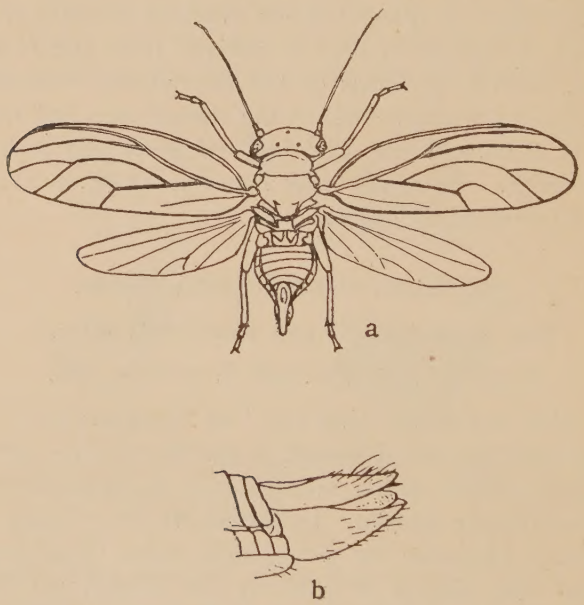

Fig. 2—(*a*) Apple Sucker (*Psylla mali*) female. Magnified 10 times.
(*b*) Ovipositor of female (lateral view). Magnified 40 times.

ten segments, and feet with two segments only; the adults have large compound eyes, and also three ocelli or simple eyes. Usually both pairs of wings are transparent, and this is the case in *Psylla mali*, which is yellow or brownish in colour, with the two terminal segments of the feeler black.

The adult winged insects may be seen flying and jumping about the trees in autumn. According to the statement of Theobald

(11, pp. 153–165)—who has lately given much attention to *Psylla mali* in the south of England—the eggs are laid in September, October, and early November. The egg is ·4 mm. in length and oval in shape, with a short "stalk" at one end by means of which it is attached to the apple tree (fig. 3, *a*). It is orange-red in colour, so that a number of eggs are conspicuous on the bark, especially when the branches are covered with green algal growth. The eggs are found mostly on the shoots, below the buds or around the leaf-scar ridges. They remain through the winter, and the young larvæ are hatched usually during the month of April. Shoots sent from Enniskillen by Mr. Peter Brock, on April 15th, had a number of unhatched eggs and a good many active first-stage larvæ on them.

The larval Psylla (fig. 3, *c*, *d*) differs in many respects from the adult. It is flat in form, the head and prothorax partly fused together; the feeler (fig. 3, *c*) has only six segments, while in the leg there is no differentiation between shin and foot (fig. 3, *e*). Between the two foot-claws there is a delicate adhesive pad. The larva of the Apple Sucker is dirty yellow, with bright red eyes, and secretes a white, woolly substance. The larvæ make their way to the buds, outside which they may sometimes be seen waiting for the leaves to open. As soon as possible they get inside the buds and suck sap from the young blossoms, which shrivel and become brown as if frost-bitten. After a time the larva becomes a nymph (fig. 3, *g*) with distinct rudiments of wings. The feelers are now more elongate (fig. 3, *g*, *h*); there are indications of segmentation in the foot (fig. 3, *j*), and the anal region differs in shape from the corresponding area in the larva (compare fig. 3, *f* and *k*).

The winged adults are developed as early as May, and they are still to be found in November; but the damage to the trees is done by the insect in the larval and nymphal stages.

With regard to preventive and remedial measures, it may be stated first, that no wash can be used with any prospect of killing the eggs. Theobald writes strongly on the point, and I may place on record that batches of twigs sent by Mr. Brock from four orchards in county Fermanagh, which had been sprayed in March with a wash advertised as effective, harboured numerous live eggs

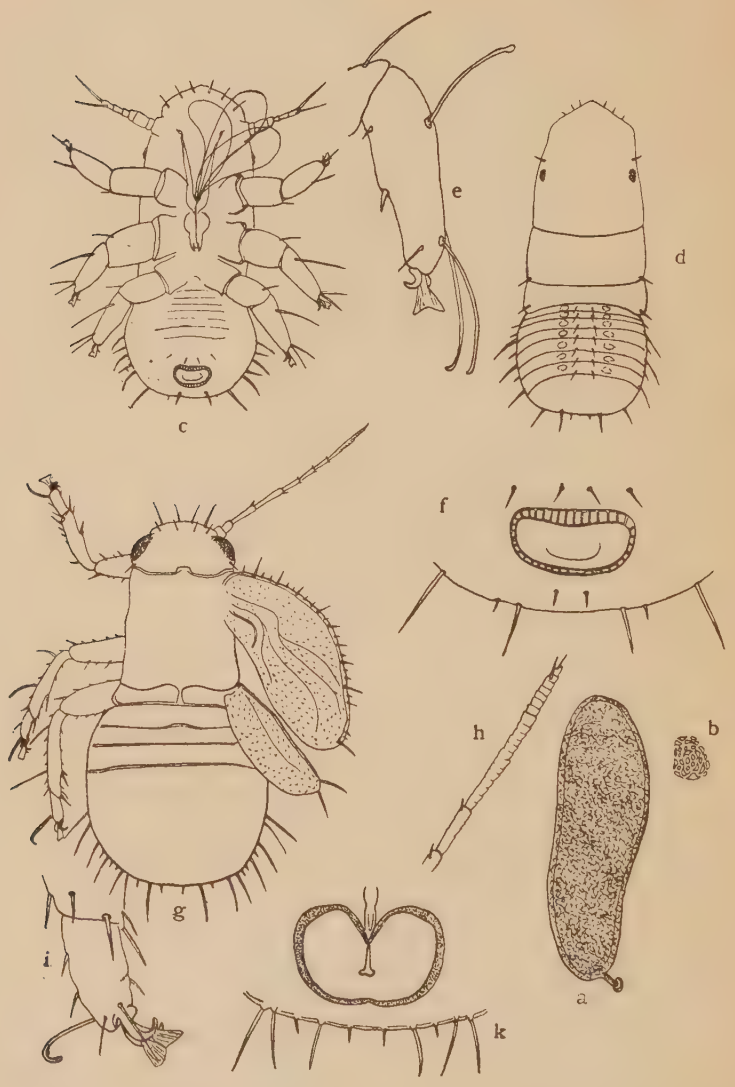

FIG. 3.—Young stages of Apple-Sucker (*Psylla mali*). (*a*) egg, × 90; (*b*) surface of egg-case, highly magnified; (*c*) young larva, ventral view, × 90; (*d*) young larva (appendages removed), dorsal view, × 90; (*e*) larval shin, foot, and claw, × 200; (*f*) anal area of larva, × 350; (*g*) nymph, × 25; (*h*) feeler of nymph, terminal segments, × 72; (*i*) foot of nymph, × 96; (*k*) anal region of nymph, × 60.

and newly hatched larvæ of Psylla. On the other hand, some twigs from an orchard at Newtownbutler, where this wash had not been used, were quite free from the suckers in any stage. With regard to these Mr. Brock informed me that they had been sprayed in the spring of 1907 with a mixture of sulphate of iron, caustic soda, and paraffin; evidently this wash had killed the newly hatched larvæ. In November, 1908, Mr. Brock again kindly sent me samples of apple twigs. Those that had been winter-sprayed in 1907–8, with the vain hope of killing the eggs, were covered with the eggs of the next generation; while those that had been sprayed twice in the spring of 1908 with quassia emulsion were free from eggs, the young suckers having been killed by this application. According to Theobald, nicotine-wash is more certain in its killing effects than quassia.

The vulnerable period of the sucker's life-history is, therefore, when the larvæ have emerged from the eggs. Theobald lays stress on the possibility of preventing their access to the buds, or indeed of preventing their exit from the egg by a thick application of salt and lime-wash in February; he states that such a wash has a directly beneficial effect on the trees. The following is his formula for its composition:—

"Slake 1½ cwt. of the best white lime, fresh from the kiln, in a small quantity of water; then mix it into 100 gallons of water, strain off, so as to exclude all grits, into another receptacle, and add to the thick lime-wash 30 lb. of dissolved salt. This wash is improved by adding 3 to 5 lb. of water-glass, previously dissolved in warm water, as it tends to hold the wash longer on the trees."

The Mussel Scale-insect.

Mytilaspis pomorum, Bouché.

From Mr. Brock, of Enniskillen, were received also in March and in May shoots of apple trees infested with numerous scales of this familiar insect, which has already been described and figured (4, pp. 438–440). The shoots had been heavily sprayed in March with Cooper's V 1 fluid; about half the eggs were alive and half dead.

The Black Vine-weevil.

Otiorrhynchus picipes (Fab.).

Specimens of this beetle—described and figured in the last of these papers (4, pp. 579–581)—were received early in May from County Carlow, where they had done much damage by eating the leaves and bark on the stems of young apple and plum trees.

The Gooseberry Sawfly.

Nematus ribesii (Scop.).

Caterpillars of this well-known fly (4, pp. 335–7) were received in June from Counties Dublin and Antrim. In the Dublin district they attacked both gooseberries and currants.

The Raspberry Shoot Moth.

Lampronia rubiella, Bjerk.

The caterpillar of this moth is well known to fruit-growers in the south of England; but not until last year did I receive complaints of damage done by it in Ireland. In the middle of April, 1908, Mr. P. Brock, of Enniskillen, sent me shoots of raspberry canes, with the information that in the small plantation whence they came 75 per cent. of the buds had been destroyed. In July, shoots similarly injured were received from Mr. W. Cooper Clibborn, of Moate, County Westmeath.

The life-history of this insect was worked out some years ago by Chapman (5), and a good general account of its habits may be found in Theobald's recent book (11, pp. 416–419). The genus Lampronia belongs to the family Tineidæ, of which the "clothes-moths" are the most familiar members. *L. rubiella* is a beautiful little insect, measuring about 10 mm. ($\frac{2}{5}$ in.) across its outspread wings, which are of a purplish-brown colour with bright yellow spots, two large ones near the hinder edge of the wing being especially conspicuous. The moths are on the wing about midsummer, and lay their eggs on the blossoms of the raspberry canes. The young caterpillar burrows into the white receptacle in the centre of each fruit-head, and remains there without feeding

for some weeks, doing no harm to the fruit. Later it makes its way to cracks in the stalks, or beneath the bark of the canes, or on to the ground, and spins a small white silken cocoon in which it passes the winter. At the beginning of March it comes out of this hiding-place, ascends the raspberry canes, and eats its way into a shoot at the base of a bud. Here the caterpillars feed on the pith, and, as result of their presence, the buds either wither up altogether, or develop into shoots which surely fail sooner or later.

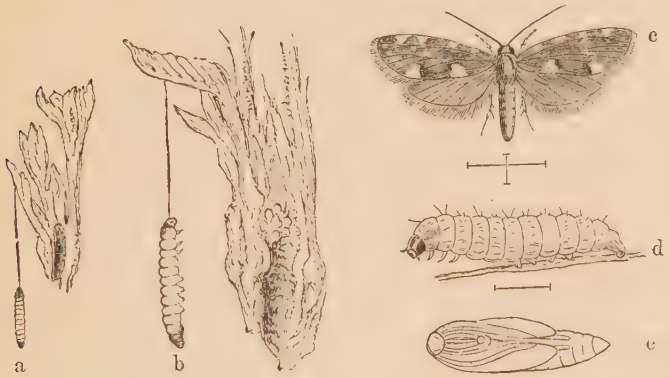

FIG. 4.—Raspberry shoot-moth (*Lampronia rubiella*): (*a*) caterpillar dropping from shoot, natural size; (*b*) the same magnified; (*c*) moth; (*d*) caterpillar; (*e*) pupa, magnified 3 times. From Ormerod's "Reports."

While the caterpillars are feeding in the canes in springtime, nothing can be done except to cut off and burn the attacked shoots. The vulnerable period of the insect's life-history is that of the wintering larvæ. These can be destroyed by burning the stakes, deeply forking the soil, and raking away the surface from the stocks, afterwards earthing them up again.

The Vapourer Moth.

Orgyia antiqua (Linn.).

An account with figures of this insect was given last year (4, pp. 577–8). An apple-shoot with a batch of its eggs was received from Antrim in February, 1908.

The Eyed Hawk-moth.

Smerinthus ocellatus (Linn.).

This large moth was also described and figured last year (4, pp. 578–9). Caterpillars were received in August from Mr. James Harvey, of Clonakilty, County Cork, who stated that they were rather destructive in the neighbourhood.

GARDEN PESTS.

Slugs and Snails.

Agriolimax agrestis (Linn.) and *Helix rufescens*, Pennant.

(Plates LVII. and LVIII.)

The common Field Slug (*Agriolimax agrestis*) has been already mentioned in connexion with damage to Potatoes (p. 593). In the summer of 1908 complaint was received from Mr. R. M. Barrington, Fassaroe, Bray, that the leaves of wallflower seedlings were being eaten into holes (Plate LVII.), and that no depredator was visible. Investigations after dark with a lantern revealed the presence of numerous specimens of *Agriolimax* and of *Helix rufescens*, which, climbing up the plants every night, devoured the leaves greedily. The latter species (Plate LVIII.) is one of the commonest of our smaller snails. The shell is of a dull brown colour, flattened in form, with six or seven whorls, often bluntly keeled on the outer edge, and with a deep umbilicus.

A dressing of lime around the plants would be found the most effective means of checking such an attack.

Millipedes.

Blaniulus, Iulus, and *Brachydesmus*.

Complaints of damage done by various kinds of millipedes to garden plants were fairly common in 1908. In an old garden at Sandymount, County Dublin, Mr. A. E. Moran, of the Society's office, found in July the roots of cauliflower, broccoli, lettuce, and carnations eaten through by large numbers of the slender, whitish, red-spotted snake-millipedes (*Blaniulus*) that have been mentioned in former years (4, pp. 295, 434, 441).

Similar damage was done, also in July, in a garden at Manorhamilton, County Leitrim, where a small, black species of *Iulus* cut through flowering-plants below the soil. In this case it was stated that a dressing of soot and lime had no effect on the millipedes.

In June, Mr. Peter Brock, of Enniskillen, sent specimens of *Brachydesmus*—a genus of millipede, which, like *Polydesmus*, has flattened out-growths from the body segments. These millipedes had proved highly destructive to primroses extensively grown for sale, and some belonging to valuable varieties. Soot had no effect on the animals; and where vaporite was applied, the plants were attacked nearer the surface of the soil than in the case of the undressed ones, so that they suffered more severely. Mr. Brock recommended watering the plants with paraffin emulsion.

A New Bulb Mite.

Histiogaster corticalis (Michael).

In February I received from the Royal Botanic Gardens, Glasnevin, a bulb of Hippeastrum attacked by mites which were feeding just beneath the covering scale-leaves. Examination showed that the mites were of the species *Histiogaster corticalis*, described and figured by Michael (8, pp. 66–71, pl. xxviii.), and found by him in various parts of England in the common reed and other plants, "immediately beneath the epidermis, . . . eating their way along . . . leaving small furrows behind them filled with dust, excremented matter, &c." On the present occasion their action was similar.

These mites belong to the Tyroglyphidæ—the family of the cheese and hay mites, and of the root mites (Rhizoglyphus). The species of Histiogaster are elongate and narrow, with a marked constriction around the middle of the body in front of the third pair of legs. The first pair of appendages are stout and powerful pincers; the legs are short with some long flexible hairs and a few clubbed bristles, but few spines. The "hypopial" nymph stage —so characteristic of this family—has been described and figured by Michael; it is more evenly ovate in shape than the adult, and

not markedly narrowed at the head region, as the mature mites, both male and female, are.

On account of the concealed manner of feeding adopted by these mites, nothing can be done except to destroy the bulb that they infest.

Fig. 5.—Bulb Mite (*Histiogaster corticalis*) Female, ventral view. Magnified 100 times.

The Lettuce Root Aphid.

Pemphigus lactucarius, Pass.

In September, 1908, lettuce plants were received from gardens at Banbridge, County Down, and Terenure, Dublin, with the roots badly infested by colonies of this aphid. The insects are covered with a white waxy secretion, which renders them very conspicuous when present in large numbers. They suck sap from the roots, and thus cause the plants to droop. The genus Pemphigus includes several species of aphids without cornicles, with simple wing-neuration, and with six-segmented feelers. According to Buckton (2, vol. iii., pp. 124–6), the young larvæ are narrow and worm-like in form. Colonies of this aphid are to be found at the roots of wall-flowers and other plants as well as of lettuce. Among the specimens examined were both winged and wingless virgin

females (fig. 6, *a*) and immature individuals, some (fig. 6, *b*) elongate wingless larvæ, and a large number of nymphs (fig. 6, *c*), with conspicuous narrow wing-rudiments.

Plants badly attacked by these aphids should be removed and burned. For those less severely affected, the injection of carbolic acid emulsion into the soil might be advantageous.

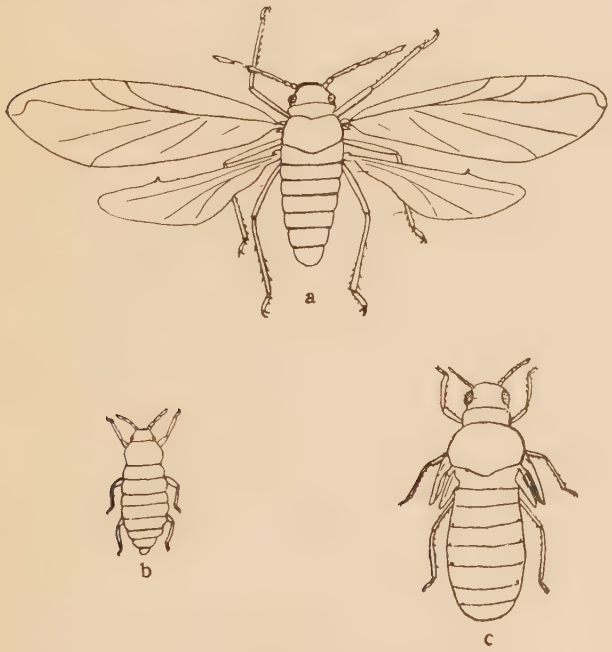

FIG. 6.—Lettuce Root-aphid (*Pemphigus lactucarius*).
(*a*) Winged female; (*b*) larva; (*c*) nymph. Magnified 16 times.

The Vine Scale-insect.

Lecanium persicæ (Geoffr.).

Shoots of grape-vine with numerous female scales of this insect were received in June, 1908, from Rathmines, Dublin. The scales, which are broad and saddle-shaped, have been well described and figured by Newstead (9, vol. ii., pp. 89-93, pl. li.).

The Black Weevil.

Otiorrhynchus sulcatus (Fab.).

The grubs of this common beetle were sent from the Royal Botanic Gardens in June, where they did much damage by eating the base of Cyclamen bulbs. The accompanying illustration (Plate LIX.) gives a good impression of the nature of the injury.

The Yellow Ant.

Lasius flavus (Fab.).

This is one of our commonest and best-known species of ant, and is not usually regarded as of any economic importance. In the year 1908, however, from midsummer until autumn, a garden near Waterford was infested with such enormous numbers of the insects that they became a serious pest. Mr. J. Johnston, the County Agricultural Instructor, kindly forwarded specimens of the ants for identification, and gave a vivid account of their abundance. He wrote :—" The place is simply alive with them ; the lawn and garden, covering about four acres, is a huge ant heap. They are everywhere—under the walks, in the walls, and in the greenhouses."

Nothing but systematic excavations, and drenching the nests preferably with very hot water, would be of service against such an invasion, the mischief being too widespread for the use of carbon bisulphide injections, except at enormous expense.

FOREST INSECTS.

The Willow and Ash Scale-insect.

Chionaspis salicis (Linn.).

In March, 1908, Mr. J. W. Warburton, of Rostrevor, sent a shoot of ash with the scales of this insect, which has already been described and figured in these papers (4, p. 263, pl. xxii., 2).

The Fir and Pine Aphids.

Chermes piceæ (Kalt.) and *C. corticalis* (Kalt.)

An account of some aphids of the genus Chermes was given in my paper of last year (4, pp. 584–6). At the end of May, branches

of Scots pine, received from a Dublin garden, were covered with the white cottony secretion due to *Chermes corticalis*. According to Gillanders (7, p. 331) this species is common and injurious in the south of England. At the end of November shoots of silver fir from Delgany, County Wicklow, were received with deformed growth caused by a species of Chermes, which appeared to be the little-known species *C. piceæ*, Ratz. According to Burdon (3, p. 132) only the wingless colonial generation of this insect is known.

Willow Beetles.

Phyllodecta sp.

The small leaf-beetles that devour, both in the larval and perfect stages, the leaves of osiers and willows, have been described and figured in a previous paper (4, pp. 449–450). Attention was called by Mr. W. S. Irving to the damage done by these insects to willows about 8 feet high near Claremorris, County Mayo.

The Pine Beetles.

Hylurgus piniperda (Linn.).

This well-known and destructive insect has been already described and figured in this series (4, pp. 443–6). At the end of December I received tunnelled shoots from the Royal Botanic Gardens, where the insect had been remarkably troublesome; probably the wintering specimens in the shoots were invaders from some neighbouring neglected plantation. A comparison of different coniferous woods shows conclusively the value of clearing away old stumps and barking felled trees.

The Pine Sawfly.

Lophyrus pini (Linn.).

This common enemy of conifers has been previously described and figured (4, pp. 447–8). It occurred at the end of July, 1908, on *Pinus insignis* at Abbeyfeale, County Limerick.

The Laburnum Moth.

Cemiostoma laburnella, Staint.

In the autumn of 1908 the caterpillar of this moth attracted much attention in the suburbs of Dublin, in Belfast, and at Moneygall, King's County, whence specimens were forwarded to me by Mr. T. R. Garvey. The caterpillars feed in September in the leaves of the laburnum, mining between the two leaf-skins, and causing unsightly brown patches to appear. They spin fine silken threads, by means of which they let themselves down from the branches, and swing to and fro in the air. In such large numbers did they indulge in this exercise that they were frequently

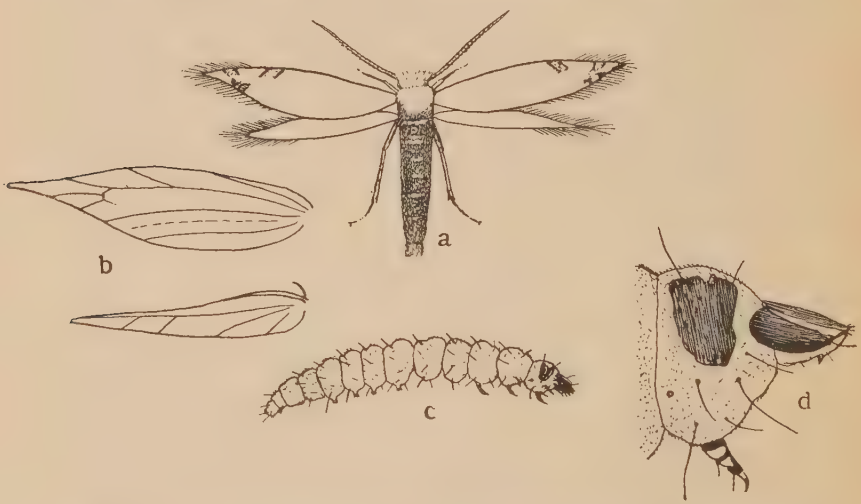

Fig. 7.—(*a*) Laburnum Moth (*Cemiostoma laburnella*), magnified 8 times; (*b*) Wing-neuration (after Meyrick) magnified 12 times; (*c*) Caterpillar, side view, magnified 8 times; (*d*) Head and prothorax of caterpillar, side view, magnified 38 times.

a considerable annoyance to the passers-by on suburban roads or country avenues where laburnums are extensively planted. They finally come down to the ground or to some support, spin white elongate silken cocoons, and within these pupate. In several cases they selected an inclined laburnum trunk as a suitable station, and the bark was whitened by their numerous cocoons. In this stage they pass the winter, and a spring brood of moths may be seen on the wing in April.

The moth is a beautiful little creature, measuring only 8 mm. ($\frac{1}{3}$ inch) across the outspread wings, which are for the most part pure white with an oblique yellow bar edged with dusky scaling from the costa, and a metallic spot edged with black on the inner edge of the forewing. The wing-fringes, as well as the head and face, are white. The moths lay their eggs below the leaves, usually near the midrib, and the caterpillars feed through June on the upper surface of the leaves, pupating in July beneath the leaves. The second brood of moths, which are the parents of the autumn caterpillars, are on the wing in August. According to Gillanders (7, pp. 287–9) the insect is much commoner on *Cytisus Laburnum* than on *C. alpinum*. The wintering cocoons can be destroyed by washing the trunks and forking the soil around the trees. If practicable, the blotched leaves with the feeding caterpillars should be removed and burned in September.

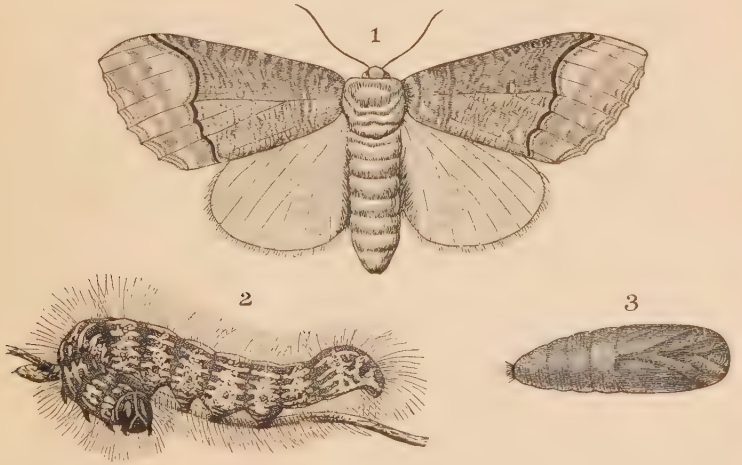

FIG. 8.—1. Buff-tip Moth (*Pygaera bucephala*). 2. Caterpillar. 3. Pupa. Natural size. From Ormerod's "Reports."

The Buff-tip Moth.

Pygæra bucephala (Linn.).

Caterpillars of this moth were received in September from Mr. H. Macardle, of Dundalk, with the information that they were proving destructive to lime trees by eating the leaves into

holes. The moth is a well-known, handsome insect, measuring 50–60 mm. (2–2½ inches) across the wings; the forewings are silvery grey with a conspicuous yellowish blotch at the tip. It appears in June and July. The eggs are laid in clusters below the leaves, and the young caterpillars, which are hatched in August, feed side by side in companies, eating one leaf after another, and migrating from branch to branch. When fully fed, in September, the caterpillar (43 mm. or 1¾ inch long) has a round black head with yellow lines, a yellowish green body with grey markings, and a broad black dorsal stripe, the whole clothed with fine whitish hairs. The pupa remains through the winter on the ground.

According to Gillanders (7, pp. 251–3) the caterpillars may be shaken down into sheets, for destruction, while the soil around the trunks may be limed in winter in order to kill the pupæ.

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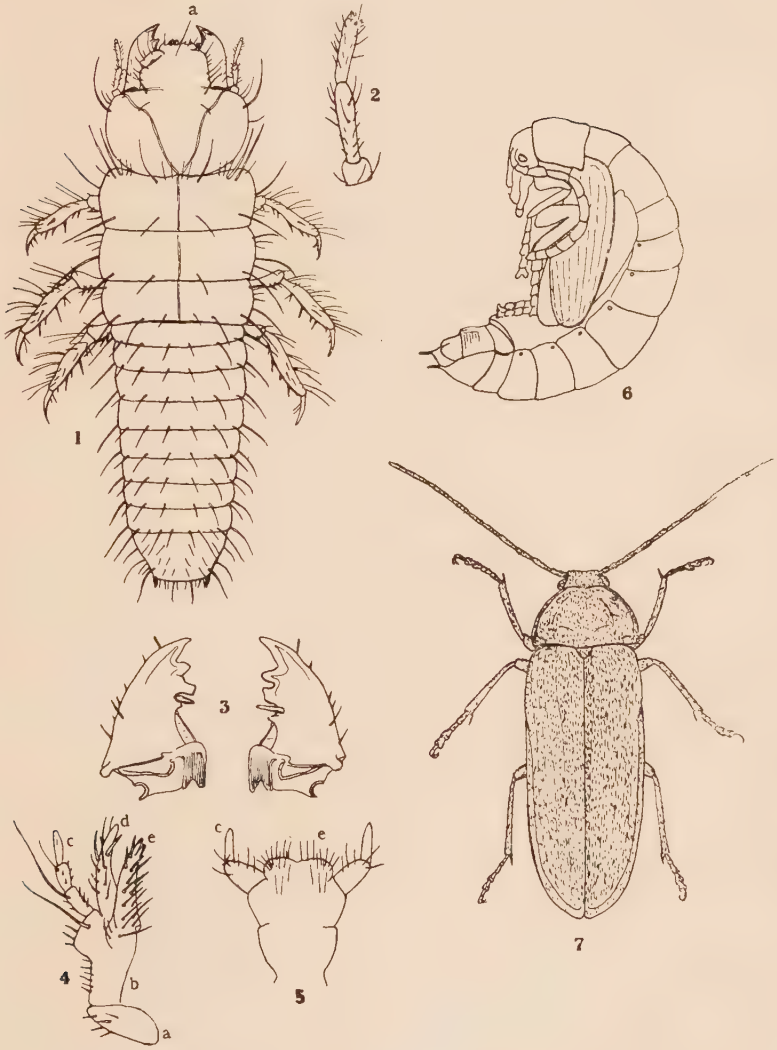
EXPLANATION OF PLATE LV.

PLATE LV.

Dascillus cervinus (Linn.).

FIG.

1. Larva, dorsal view. Magnified 5 times. The legs have been pulled out from beneath the body). (*a*) labrum.
2. Right feeler of larva. Magnified 15 times.
3. Mandibles of larva (ventral view). Magnified 9 times.
4. Left maxilla of larva (ventral view). Magnified 15 times. (*a*) cardo ; (*b*) stipes ; (*c*) palp ; (*d*) galea ; (*e*) lacinia.
5. Labium of larva. Magnified 15 times. (*c*) palp ; (*e*) ligula.
6. Pupa, lateral view. Magnified 5 times.
7. Beetle, dorsal view. Magnified 5 times.



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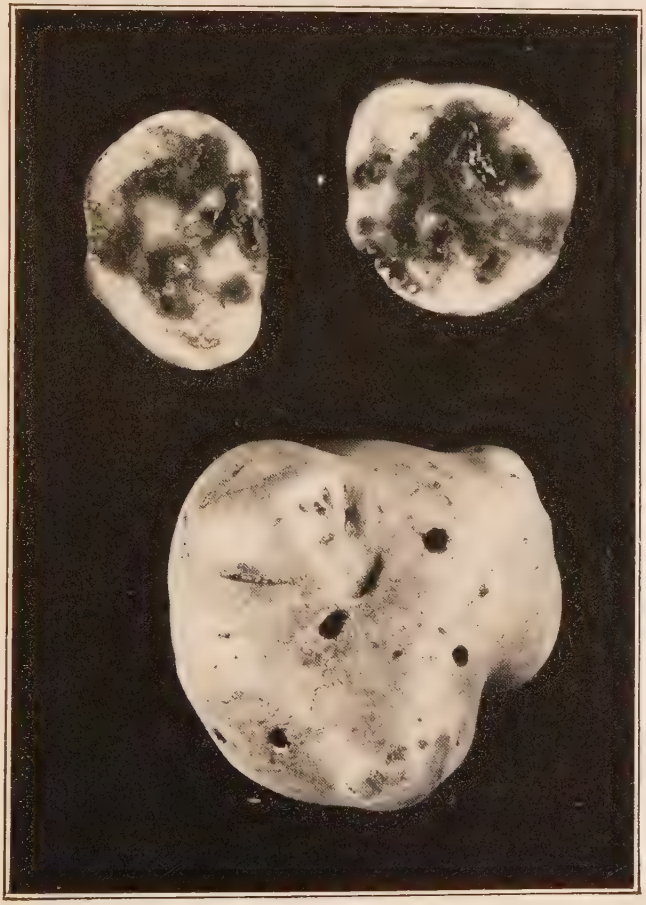
EXPLANATION OF PLATE LVI.

PLATE LVI.

Potatoes injured by the Field Slug (*Agriolimax agrestis*). Photograph by T. Price.



EXPLANATION OF PLATE LVII.

PLATE LVII.

Wallflower Seedlings eaten by *Agriolimax* and *Helix rufescens*.
Photograph by T. Price.

EXPLANATION OF PLATE LVIII.

PLATE LVIII.

Shells of *Helix rufescens*. Photograph by T. Price.

EXPLANATION OF PLATE LIX.

PLATE LIX.

Cyclamen eaten by *Otiorrhynchus* grubs. Photograph by T. Price.